



## Effect of pruning on recovery and productivity of cold-injured Merlot grapevines

By: Markus Keller and Lynn Mills

In: American Journal of Enology and Viticulture. 58(3):351-357. 2007

- Grapegrowers in areas that can experience winter freezing –like South-East Washington – face the challenge of occasional cold injury to the vines. This injury causes browning and deactivation of the *vascular cambium* and the *phloem tissue*. The economic consequences are substantial yield fluctuations, and in severe cases, the need to retrain the vines from the ground up.
- According to previous reports, the ability of vines to reactivate freeze-damaged tissue seems to be stimulated by the release of the growth hormone auxin in swelling buds during budbreak. The current authors hypothesized that, if the vascular cambium is reactivated during bud swelling, then one potential strategy to overcome severe cold injury would be to delay winter pruning until after budbreak, thus maximizing auxin production.
- The extreme cold winter of 2002 (-11.5°C on October 31), which left behind extensive trunk damage in the experimental site located in Prosser, Washington, provided the authors with excellent material to test their hypothesis. Using a randomized block design with 3 replications per treatment (10 vines per replication), they imposed the following treatments during 2 consecutive seasons (2003 and 2004):
  - 1 - Standard spur pruning: pre-budbreak (early March) (Control)
  - 2 - Late spur pruning: post-budbreak (mid-May)
  - 3 - Standard spur pruning + Late re-pruning: double pruning (early March, mid-May)
  - 4 - Minimal pruning (no pruning except for some cane trimming)
  - 5 - Minimal pruning with total disbudding (all buds sliced off) (Negative control)

The standard pruning served as Control (even though, obviously, a true control –without experiencing freezing temperatures- was impossible). The disbudded minimal pruning served as a “negative control”, that is, it was designed to mimic 100% bud damage through disbudding. Overall, pruning treatments led to a range of buds left per vine from 0 (disbudded treatment) to 186 (minimal treatment).

- **Results .** 1) As assessed at harvest through visual observation of dissections, field trunk damage was 67%, and primary bud damage was 25%. The authors believe that the discrepancy between the injury frequencies to trunks and to buds may be attributed to temperatures near the ground being somehow colder. Vines on the low-lying southern end, which had restricted air drainage due to an unharvested corn field, showed more damage [Was this taken into consideration during the experiment lay-out? The authors do not say if this vineyard end was left out]
- 2) The proportion of buds that burst was 90% for the pre-budbreak treatments, and 65% for the post-budbreak treatments or those not pruned at all. (Even completely disbudded vines grew up to 25

vigorous shoots from basal buds on the canes and latent buds on the cordons.) That is, neither the timing of pruning, nor the amount of buds left led to differences in vine recovery the subsequent season. Differences in bud number/vine simply resulted in equivalent differences in shoot number.

- 3) Increasing numbers of buds –shoots- were associated with increasing numbers of clusters, and therefore, increasing yields. Minimal pruning led to the highest yield in both seasons, whereas double-pruning and disbudding led to the lowest (these treatments had been left at pruning with an average of 100 buds/vine and 7 buds/vine, respectively, which explains the yield differences).

4) TA, pH and color were unaffected by pruning treatment, despite the wide range of yield. Brix correlated negatively with yield, suggesting that increased crop levels (4.8 kg/vine, or 4.4 tons/acre) delayed sugar accumulation. Overall, year-to-year variations in fruit composition were clearly more important than variations due to pruning treatment.

- Their experimental journey completed, all vines were restored to the standard 2-bud spur pruning after 2004 and they produced normal crops, with no carry-over effects of the various pruning treatments.

The authors' conclusions were:

- \_ pruning time and bud number may not influence vine survival after a freezing episode;
- \_ the response to disbudding suggests to the authors that it may be possible to reestablish new spur positions on older cordons by simply pruning off old spurs;
- \_ minimal or light mechanical pruning may be a viable, inexpensive, and temporary strategy to achieve acceptable crop yields following cold damage.